REMARKS

All claims stand rejected under 35 USC 103 over the applicant's FIG. 1 in view of Pientka and/or over applicant's FIG. 1 in view of Zanardelli. Applicant respectfully traverses.

The present invention is concerned with apparatus for performing scattered radiation measurements, for example in order to determine presence of impurities in a fluid. In accordance with the invention as defined in claim 27, apparatus for performing scattered radiation measurements comprises an emitting device (designated 1, 8 in FIG. 2), a receiving device (designated 2, 9) and a window having a first side presented towards the emitting device and receiving device and a second side that bounds a volume of fluid. Radiation emitted from the emitting device arrives at a target location spaced from the second side of the window along a first path and the receiving device receives radiation that leaves the target location along a second path, which is at an angle of about 90° to the first path. Consequently, the receiving device does not receive radiation directly from the emitting device but receives only scattered radiation. If, for example, the receiving device receives no light, this will indicate that there are no scattering particles at the target location, whereas if the receiving device receives light, the intensity of the received light will depend on the density of scattering particles at the target location. In accordance with claim 27, the emitting device (1, 8) comprises a radiation source (1) and a deflection element (8) that is positioned to receive radiation from the radiation source and to deflect such radiation towards the window.

Since the target location is spaced from the second side of the window, the geometry of the apparatus must be selected having regard to the material of the window and the fluid in the volume bounded by the second side of the window to avoid total reflection at the interface between the window and the fluid. This imposes an upper limit on the angle of incidence of the light entering the window from the emitting device and in turn imposes an upper limit on the distance between the point at which radiation from the emitting device enters the window and the point at which radiation passing to the receiving device leaves the window at the first side.

Both Pientka and Zanardelli are concerned with detecting moisture on a surface, particularly rain water on the front surface of an

automobile windshield. Zanardelli, for example, discloses a windshield moisture detector in which light that is introduced into the windshield from the rear surface thereof is reflected from the front surface in the event that the front surface is dry but is partially transmitted through the front surface in the event that the front surface is wet. Thus, to the extent that the cited references disclose that light passes from an emitting device to a target location and passes from the target location to a receiving device, the references disclose that the target location is at the surface of the windshield and do not disclose or suggest that the target location is spaced from the window, as required by claim 27.

In Zanardelli and Pientka, only reflected light is received by the light receiver 11, 30, and the reflected light provides no information regarding impurities that might be present in the water on the front surface of the windshield.

Both Pientka and Zanardelli rely on total reflection taking place at the front surface of the windshield when the front surface of the windshield is dry and light being partially reflected from the front surface in the event that the front surface is wet. This mode of operation is the reverse of that required by the present invention and imposes a lower limit on the angle of incidence of light on the rear surface of the windshield and also imposes a lower limit on the distance between the point at which light enters the windshield from the light emitting device and the point at which light leaves the windshield at the rear surface and passes to the detecting device. Both Pientka and Zanardelli teach that there should be multiple reflections at the front surface of the windshield for improved reliability of detection of moisture on the front surface. The need for multiple traversals of the windshield further increases the minimum distance between the point at which light enters the windshield from the light emitting device and the point at which light leaves the windshield and passes to the detecting device.

In accordance with the present invention, it is necessary to avoid reflection at the surfaces of the window because such reflection reduces the amount of radiation that is available for scattering at the target location. Further, there is no possibility of measurements at multiple locations because the first and second paths define a single target location.

Pientka is particularly concerned with measures for discriminating between the effective radiation 11 emitted by the radiation source 10 and interference radiation 31 that enters the windshield from the front surface. Pientka teaches that this discrimination should be accomplished by selective total reflection at the surface 25 of the coupling out part 22.

Contrary to the examiner's assertion, there is no disclosure in Pientka that the coupling in and coupling out parts 13 and 22 are used to provide a compact configuration. On the contrary, the coupling out part 22 is provided to discriminate between the effective radiation and the interference radiation and it appears that the coupling in part 13 is identical to the coupling out part to avoid potential errors in installation by ensuring that the positions of radiation source and radiation receiver are equivalent.

Zanardelli is generally similar to Pientka and is mainly concerned with achieving a structure that is relatively unaffected by ambient light. In particular, the contact pad 13 at which the prism structure 10, 20 is in contact with the windshield 4 is positioned so that ambient light does not have a direct, unreflected light path to the light detector. See column 4, lines 26-28.

Any similarity that might be seen between the structure shown in FIG. 1 and the structures of Pientka and Zanardelli is misleading because it suggests a similarity in mode of operation when in fact there is none. Whereas both Pientka and Zanardelli are concerned with providing a line-of-sight optical path from the light emitter to the light receiver and utilizing variation in reflectivity of one of the reflective surfaces that define the optical path as a measurement variable from which to infer whether that surface is wet or dry, the structure shown in FIG. 1 is concerned with avoiding a line-of-sight optical path from the emitting device to the receiving device, such that the receiving device will receive no radiation except that which undergoes scattering at the target location. Applicant therefore submits that neither Pientka nor Zanardelli is properly combinable with FIG. 1, and therefore the question of what FIG. 1 and Pientka or FIG. 1 and Zanardelli would suggest to a person of ordinary skill in the art does not arise.

If, nevertheless, the examiner contends that each of Pientka and Zanardelli is properly combinable with FIG. 1, applicant submits for

the reasons set forth above that a person of ordinary skill in the art, presented with the disclosure of FIG. 1 and Pientka or FIG. 1 and Zanardelli, and without knowledge of applicant's invention, would not be induced to modify the structure shown in FIG. 1 to arrive at the present invention as defined in claim 27.

In view of the foregoing, applicant submits that the independent claims are patentable. It follows that the dependent claims also are patentable.

Respectfully submitted,

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